IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellants:	Roger HANSEN et al.	§	Confirmation No.:	5369
		§		
Serial No.:	10/737,374	§	Group Art Unit:	2114
		§		
Filed:	December 16, 2003	§	Examiner:	Loan Truong
		§		
For:	Persistent Memory Device For Backup Process Checkpoint States	§ § §	Docket No.:	200312027-1

APPEAL BRIEF

Mail Stop Appeal Brief – Patents Date: June 30, 2010
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Appellants hereby submit this Appeal Brief in connection with the above-identified application. A Notice of Appeal is filed concurrently herewith.

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I. REAL PARTY IN INTEREST

The real party in interest is Hewlett-Packard Development Company, L.P. (HPDC), a Texas Limited Partnership, having its principal place of business in Houston, Texas. HPDC is a wholly owned affiliate of Hewlett-Packard Company (HPC). The Assignment from the inventors to HPDC was recorded on December 12, 2003, at Reel/Frame 014817/0808.

II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals or interferences.

III. STATUS OF THE CLAIMS

Originally filed claims:	1-37.
Claim cancellations:	10-37.
Added claims:	38-41.
Presently pending claims:	1-9 and 38-41.
Presently appealed claims:	1-9 and 38-41.

IV. STATUS OF THE AMENDMENTS

No claims were amended after the final Office action dated May 5, 2010.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

This section provides a concise explanation of the subject matter defined in each of the independent claims, referring to the specification by page and line number or to the drawings by reference characters as required by 37 C.F.R. § 41.37(c)(1)(v). Each element of the claims is identified with a corresponding reference to the specification or drawings where applicable. The specification references are made to the application as filed by Appellants. Note that the citation to passages in the specification or drawings for each claim element does not imply that the limitations from the specification and drawings should be read into the corresponding claim element. Also note that these specific references are not exclusive; there may be additional support for the subject matter elsewhere in the specification and drawings.

The various embodiments are directed to a persistent memory device for backup process checkpoint states.[1] At least some of the illustrative embodiments are systems as in claim 1:[2]

1. A system for storing checkpoint data comprising:
   a network interface to an external network; **{6, [0022], lines 1-11; Figure 1A, element 114}** and
   a persistent memory unit coupled to the network interface, **{6, [0022], lines 1-11; Figure 1A, element 102}** wherein:
      the persistent memory unit is configured to receive the checkpoint data into a region of the persistent memory unit via a remote direct memory write command from a primary process through the network interface **{6, [0024], lines 1-8}**, and to provide access to the checkpoint data in the region via a remote direct memory read command from a backup process through the network interface **{6, [0024], lines 1-8}**, wherein the remote direct memory write command is preceded by a create request for the

[1] Specification Title.

[2] Citations to the specification from this point take the form **{[page], [[paragraph]], lines [lines within the paragraph]}.**

region **{13, [0047], lines 1-15} {14, [0047], 15-16}** and the read command is preceded by an open request for the region **{13, [0047], lines 1-15} {14, [0047], 16-17}**; and

the backup process provides recovery capability in the event of a failure of the primary process. **{6, [0024], lines 4-6}**

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1-9 and 38-41 are obvious under 35 USC § 103(a) over DeKoning (U.S. Pat. No. 6,691,245) and Boyd et al. (U.S. Pat. No. 6,721,806, hereafter "Boyd").

VII. ARGUMENT

A. Section 103 Rejections of Claim 1-9 and 38-41 Over DeKoning and Boyd

Claims 1-9 and 38-41 stand rejected as allegedly obvious over DeKoning and Boyd. Claim 1 is representative of this grouping of claims. The grouping should not be construed to mean the patentability of any of the claims may be determined in later actions (*e.g.*, actions before a court) based on the groupings. Rather, the presumption of 35 USC § 282 shall apply to each of these claims individually.

DeKoning is directed to data storage with host-initiated synchronization and fail-over of remote mirror.[3] In particular, DeKoning is directed to a system to "serv[e] the storage requirements of the client devices 104."[4] In the mirroring and fail-over system of DeKoning, what appears to be important is that the **data** on the storage devices be accessible in the event of failure of the host device 106 and/or storage 108.

> [T]he client devices 104 utilize the remote host device 109 and the remote storage device 110 as a fail-over storage system in the event of a failures of the local storage device 108 and/or the local host device 106.[5]

The theme regarding the data being the important aspect of DeKoning is repeated throughout.

> The business continuance client 115 then instructs the client devices 104 to switch to using the remote host device 109 and the remote storage devices 110 **for the primary data storage**.[6]
>
> To ensure quick and reliable fail-over to the remote host device 109 and storage device 110, the local host device 106 periodically initiates a "checkpoint," … **to synchronize *data* stored throughout the mirrored storage system 102**.[7]

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[3] DeKoning Title.

[4] DeKoning Col. 5, lines 42-43.

[5] DeKoning Col. 5, lines 34-38.

[6] DeKoning Col. 5, lines 52-54 (emphasis added).

[7] DeKoning Col. 5, lines 58-62 (emphasis added).

Thus, there does not appear to be process (*i.e.*, a program) in DeKoning that must be provided proper state data to continue in the event of a failure, merely a continuity of data accessible by client devices 104. Stated otherwise, the "checkpoint" data in DeKoning is merely to ensure two disks hold the same data (or can be rewound to a particular point), not to ensure a backup process can pickup at the same point as a failed process.

Moreover, the communication of "checkpoint" data in DeKoning is consistent with the data continuity (rather than process continuity) theme. Dekoning's Figure 1 is reproduced for convenience of the discussion.

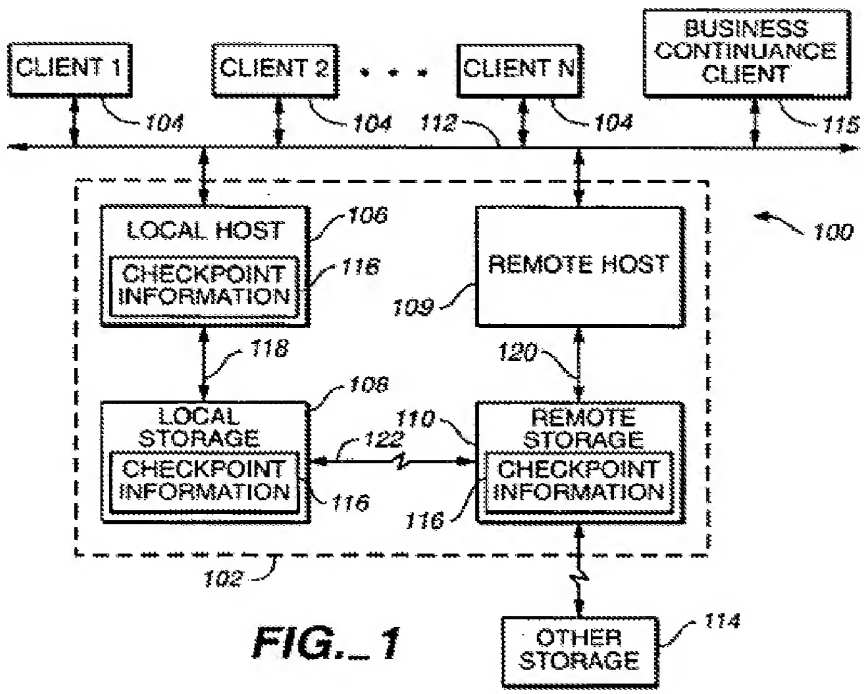

FIG._1

In particular, the flow of "checkpoint" data begins with the local host 106, and flows between the local host 106 and the local storage 108 across the link 118.

> [T]he local host 106 generates and stores the checkpoint information 116 and sends the checkpoint information 116 in a message to the local device 108.[8]

[8] DeKoning Col. 8, lines 54-57.

It is the local storage device 108 itself that sends the checkpoint data to the remote storage device 110, not the local host 106.

> The local storage device 108 then forwards the checkpoint information 116 in the message to the remove device 110.[9]

Thus, the flow of "checkpoint" data is from the local host 106, across the communication link 118, to the local storage 108, and then from the local storage 108, across the communication link 122, to the remote storage 110.

Representative claim 1, by contrast, specifically recites:

> 1. A system for storing checkpoint data comprising:
> a network interface to an external network; and
> a persistent memory unit coupled to the network interface, wherein:
> the persistent memory unit is configured to receive the checkpoint data into a region of the persistent memory unit via a remote direct memory write command from a primary process through the network interface, and to provide access to the checkpoint data in the region via a remote direct memory read command from a backup process through the network interface, wherein the remote direct memory write command is preceded by a create request for the region and the read command is preceded by an open request for the region; and
> the backup process provides recovery capability in the event of a failure of the primary process.

Appellants respectfully submit that DeKoning and Boyd fail to teach or suggest such a system.

<u>The "Checkpointing" Of Dekoning Is Merely Data Mirroring</u>

DeKoning is directed to what, in effect, is a system to ensure data is properly mirrored. DeKoning fails to address a primary process (*i.e.*, a program) and a backup process that perform the same task as the primary process. The

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[9] DeKoning Col. 8, lines 60-62.

"checkpoint" data of DeKoning does not appear to be used by the remote host 109 process; rather, the remote host 109 is merely a conduit for access to the data by clients 104. Thus, even if hypothetically the teachings of Boyd are precisely as the Office action suggests (which Appellants do not admit), DeKoning and Boyd still fail to teach or suggest "the persistent memory unit is configured to receive the checkpoint data ... via a remote direct memory write command from **a primary process** ..., and to provide access to the checkpoint data ... from **a backup process** through the network interface ... the backup process provides recovery capability in the event of a failure of the primary process." For this reason alone the rejection should be overturned and the claim set for issue.

The Broadest Reasonable Interpretation Cannot Expand the
<u>"Backup Process" To Include Programs That Merely Backup Data</u>

Appellants understand and acknowledge that Examiners are to use the broadest reasonable interpretation of claims when examining for patentability. However, the reasonableness of an interpretation is bounded by Appellants' specification. In particular, the Manual of Patent Examining Procedures (MPEP) admonishes:

> During patent examining, the pending claims must be "given their broadest reasonable interpretation **consistent with the specification.**"[10]

Appellants respectfully submit that the Office action interprets the terms "primary process" and "backup process" in a manner that is wholly inconsistent with Appellants' specification and the representative claim.

In particular, the Response to Arguments Section of the Office action takes the position that the claimed "primary process" and "backup process" are unrelated processes.

> Based on the broadest interpretation of the claim language, the primary process and the backup process can be interpreted by one of ordinary skill in the art to equate to a normal processing operation and a backup operation. DeKoning teach [sic] of **normal**

[10] MPEP 8th, Rev. 6, August 2007, § 2111, p. 2100-46 (emphasis added).

> **processing in which checkpoint procedure is periodically initiated by the local host device** and **backup operation where the local storage device synchronizes all new data** with the remote storage device by sending the checkpoint information in a message.[11]

As best understood, the position of the Office action is that a process on the local host 106 that creates and writes the checkpoint information is the claimed "primary process," and process on the local storage 108 that transfers the checkpoint information 116 to the remote storage 110 is the claimed "backup process." The interpretation is wholly inconsistent with Appellants' specification, which indicates that the backup process takes over the functionality of the primary process in the event of a failure:

> Backup process 122 running on processor node 106 can initiate remote commands, for example, a write command to send data for checkpoint sate 120 in NPMU 102. Primary process 116 can also provide data for checkpoint state 120 periodically. **Backup process 122 … is configured to perform the functions of primary process 116 in the event of a failure of primary process 116**.[12]

Thus, the "broadest interpretation of the claim language" presented by the Office action is neither reasonable nor consistent with the Appellants' specification, and thus is improper.

Moreover, representative claim 1 recites, "backup process provides recovery capability in the event of a failure of the primary process," which in view of the Specification further buttresses that the claimed "primary process" and "backup process" are more related than just any program and a program to backup data. For these additional reasons the rejections should be overturned and the claims set for issue.

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[11] Office action of May 5, 2010, page 2, paragraph spanning pages 2 and 3 (emphasis added, internal citation to DeKoning omitted).

[12] **{6, [0024], lines 1-6} (emphasis added).**

Even If The Claims Are Interpreted to Cover Any Program and Program to Backup Data, DeKoning Fails to Teach the Claimed Interaction

Even if hypothetically the claims are interpreted to cover any program and program to backup data (which Appellants do not admit is proper), DeKoning and Boyd fail to teach or suggest the flow of data or the access of the claims. In DeKoning, the "checkpoint" data flows in a chain from the local host 106, to the local storage 108, and then to the remote storage 110.

By contrast, in representative claim 1 the process checkpoint data is accessed in a "star" pattern, where the data is placed at a location by the primary process through a network interface, and the data is read by the backup process **through the very same network interface**. In particular, illustrative claim 1 recites, "the persistent memory unit is configured to receive the checkpoint data into a region of the persistent memory unit **via a remote direct memory write command from a primary process *through the network interface***, and **to provide access** to the checkpoint data in the region via a remote direct memory read command from a backup process **through *the* network interface**... ." Thus, even if hypothetically the teachings of Boyd are precisely as the Office action suggests (which Appellants do not admit), DeKoning and Boyd still fail to teach the placing and reading of the process checkpoint data through the same network interface.

Based on the foregoing, Appellants respectfully submit that the rejections of the claims be reversed, and the claims set for issue.

B. Conclusion

For the reasons stated above, Appellants respectfully submit that the Examiner erred in rejecting all pending claims. It is believed that no extensions of time or fees are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required (including fees for net addition of claims) are hereby authorized to be

charged to Hewlett-Packard Development Company's Deposit Account No. 08-2025.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

1. A system for storing checkpoint data comprising:

a network interface to an external network; and

a persistent memory unit coupled to the network interface, wherein:

the persistent memory unit is configured to receive the checkpoint data into a region of the persistent memory unit via a remote direct memory write command from a primary process through the network interface, and to provide access to the checkpoint data in the region via a remote direct memory read command from a backup process through the network interface, wherein the remote direct memory write command is preceded by a create request for the region and the read command is preceded by an open request for the region; and

the backup process provides recovery capability in the event of a failure of the primary process.

2. The system of Claim 1, further comprising:

a persistent memory manager configured to program the network interface with information used by the network interface to perform virtual-to-physical address translation.

3. The system of Claim 1, wherein the persistent memory unit is configured to provide remote direct memory read access to the checkpoint data to another processor, and the backup process is executed by the other processor.

4. The system of Claim 1, wherein the persistent memory unit provides the checkpoint data through remote direct memory reads by the backup process after the primary process fails.

5. The system of Claim 1, wherein the persistent memory unit is configured to store multiple sets of checkpoint data through remote direct memory writes sent from the processor at successive time intervals.

6. The system of Claim 5, wherein the persistent memory unit provides the multiple sets of checkpoint data through remote direct memory reads upon request by the backup process at one time.

7. The system of Claim 1, wherein the primary process provides the checkpoint data to the persistent memory unit independently from the backup process.

8. The system of Claim 1, wherein the persistent memory unit is configured as part of a remote direct memory access-enabled system area network.

9. The system of Claim 1, wherein the persistent memory unit is configured with address protection and translation tables to authenticate requests from remote processors, and to provide access information to authenticated remote processors.

38. The system of Claim 1, wherein the persistent memory unit is further configured to store meta-data regarding the contents and layout of memory regions within the persistent memory unit and to keep the meta-data consistent with the checkpoint data stored on the persistent memory unit.

39. The system of Claim 1, wherein the persistent memory unit is further configured to provide access to the checkpoint data in another region via a remote direct memory read command from the backup process through the network interface, wherein the read command is preceded by an open request for the another region.

40. The method of Claim 1, wherein the checkpoint data received by the persistent memory unit overwrites a current set of the checkpoint data.

41. The method of Claim 1, wherein the checkpoint data received by the persistent memory unit is appended to a previous set of the checkpoint data.

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.